

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2005/014202

International filing date (day/month/year)
30.12.2005

Priority date (day/month/year)
30.12.2004

International Patent Classification (IPC) or both national classification and IPC
INV. C07D263/56 G02B1/04 C08L69/00

Applicant
ESSILOR INTERNATIONAL ...

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of
this opinion

see form
PCT/ISA/210

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2005/014202

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in electronic form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

- ☐ the entire international application
- ☒ claims Nos. 1-3,7,12-17(all part)

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search (*specify*):
- ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 1-3,7,12-17(all part) are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet

- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed (*specify*):
- ☐ no international search report has been established for the whole application or for said claims Nos.
- ☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:
 - ☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
 - ☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
 - ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13ter.1(a) or (b).
- ☐ a meaningful opinion could not be formed without the tables related to the sequence listings; the applicant did not, within the prescribed time limit, furnish such tables in electronic form complying with the technical requirements provided for in Annex C-bis of the Administrative Instructions, and such tables were not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in electronic form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.
- ☐ See Supplemental Box for further details

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
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Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
- ☒ paid additional fees
 - ☐ paid additional fees under protest and, where applicable, the protest fee
 - ☐ paid additional fees under protest but the applicable protest fee was not paid
 - ☐ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☒ all parts.
 - ☐ the parts relating to claims Nos.

Box No. V Reasoned statement under Rule 43b/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-3(part),4-6,7(part),8-11,12-17(part)
	No: Claims	
Inventive step (IS)	Yes: Claims	1-3(part),4-6,7(part),8-11,12-17(part)
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-3(part),4-6,7(part),8-11,12-17(part)
	No: Claims	

2. Citations and explanations

see separate sheet

Reference is made to the following documents:

- D1: US-A-5 587 112 (cited in the application)
- D2: US-A-5 298 189 (cited in the application)
- D3: REISER A ET AL: "FLUORESCENCE OF AROMATIC BENZOXAZOLE DERIVATIVES" JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, AMERICAN CHEMICAL SOCIETY, vol. 94, no. 7, 1972, pages 2414-2421.

Re Item III

The initial phase of the search revealed a very large number of documents relevant to the issue of novelty. So many documents were retrieved that it is impossible to determine which parts of the claims 1-3, 7 and 12-17 may be said to define subject-matter for which protection might legitimately be sought (Article 6 PCT). For these reasons, the search was performed taking into consideration the non-compliance in determining the extent of the search of said claims.

The search was restricted to compounds defined in claims 4 or 8 (see also Formula 4 on page 8), to compounds of Formula 5 shown on page 9 and to the compound defined in claims 6 and 11 (polymer blends containing them, the use of the polymer blends and the preparation of the compounds).

Claims relating to inventions in respect of which no International Search Report has been established need not to be subject of the Written Opinion of the International Searching Authority (Rule 43bis.1(b) PCT in combination with Rule 66.1(e) PCT).

Re Item IV

The International Searching Authority found multiple (groups of) inventions in this international application, the reasons being the following:

The closest state of the art for the present application is represented by D1 relating to

2-benzazoyl compounds (cf. claim 1 of D1). The fluorescent compounds are used in scintillator devices to detect high energy particles and electromagnetic radiation and in UV filter materials and devices such as eyeglass lenses, sunglasses, safety glasses, face shields or protective coatings (cf. columns 3 and 9).

Preferred polymeric matrix materials for use in UV filters and lenses include polycarbonate and polymethyl methacrylate. The 2-benzazoyl compounds of D1 possess excellent solubility in polymeric matrices providing intense visible fluorescence to the polymer composition (cf. column 7). A significant advantage of some of the organic, fluorescent materials of D1 over conventional UV filter materials, is that the materials appear colorless to the eye, while having a UV cutoff near to, or below 400 nm, i.e., the material is substantially opaque to UV radiation (cf. column 9).

The compounds of examples 1-7, 10 and 11 of D1 fall within the terms of the present claims 1-3 and the polymers produced in examples 8 and 9 of D1 destroy the novelty of present claims 12, 13, 15 and 16. Furthermore, the generic group defined in claim 1 of D1 encompasses compounds in which R_2 is *an added benzazoyl*, benzazoyl being 2-benzoxazoyl, 2-benzothiazoyl or 2-benzothiazoyl (cf. columns 3 and 4 of D1).

The following bis-benzoxazoyl compounds, also falling within the present claims, are specifically mentioned in D1: 3,6-bis-(2-benzoxazoyl)-2-hydroxydibenzofuran, 3,6-bis-(6-methyl-2-benzoxazoyl)-2-hydroxydibenzothiophene and 2,7-bis-(6'-methyl-2-benzoxazoyl)-9-ethyl-3-hydroxycarbazole. Such bis-benzazoyl compounds are expected to have exceedingly high extinction coefficients with concomitant short fluorescence lifetimes (cf. column 23).

The technical problem underlying the present claims 1-11 is seen in the provision of alternative compounds for use as UV filters.

In view of the above mentioned teaching of D1, the different groups of compounds according to the present claims do not share a common special technical feature as required by Rule 13.2 PCT and the application lacks unity of invention (Rule 13.1 PCT).

The following different inventions can be identified:

- I Compounds defined in claim 4 or 8, polymers containing them, their use in a manufacturing method and their preparation.
- II Compounds defined by Formula 5 on page 9 and the compound defined in claims 6 and 11, polymers containing them, their use in a manufacturing method and their preparation.

Re Item V

First invention:

- 1) The subject-matter according to the first invention is new (Article 33(2) PCT).

The group of compounds according to the first invention differs from the disclosure of D1 in that the central ring is a phenolic and not a tricyclic group.

- 2) The subject-matter according to the first invention involves an inventive step (Article 33(3) PCT).

D1 represents the closest prior art (cf. above).

The technical problem underlying the first invention is seen in the provision of alternative compounds for use as UV filters.

D2, being mentioned in column 2 of D1, discloses further fluorescent compounds for use in scintillator devices to detect high energy particles but does not mention the use of the compounds as UV filters. The compounds of D2 contain a central phenol group but only uncondensed benzazolyl groups linked thereto (cf. claim 1 of D2 and examples).

The skilled person faced with the above mentioned technical problem might regard the compounds of D2 as suitable solution to its problem. However, the document does not appear to prompt the skilled person to modify the compounds of D1 so as to arrive at the compounds of the first invention. Therefore, inventive activity appears to

be involved.

The claims relating to polymers containing said compounds, their use in a manufacturing method and their preparation therefore also appears to involve an inventive step.

Second invention:

- a) The subject-matter of the second invention is new (cf. below; Article 33(2) PCT).
- b) The subject-matter of the second invention involves an inventive step (Article 33(3) PCT).

The closest state of the art is represented by D1 relating to 2-benzazoly compounds (cf. claim 1 of D1). The fluorescent compounds are used in scintillator devices to detect high energy particles and electromagnetic radiation and in UV filter materials and devices such as eyeglass lenses, sunglasses, safety glasses, face shields or protective coatings (cf. columns 3 and 9).

Preferred polymeric matrix materials for use in UV filters and lenses include polycarbonate and polymethyl methacrylate. The 2-benzazoly compounds of D1 possess excellent solubility in polymeric matrices providing intense visible fluorescence to the polymer composition (cf. column 7). A significant advantage of some of the organic, fluorescent materials of D1 over conventional UV filter materials, is that the materials appear colorless to the eye, while having a UV cutoff near to, or below 400 nm, i.e., the material is substantially opaque to UV radiation (cf. column 9).

The following bis-benzoxazoly compounds are specifically mentioned in D1:
3,6-bis-(2-benzoxazoly)-2-hydroxydibenzofuran,
3,6-bis-(6-methyl-2-benzoxazoly)-2-hydroxydibenzothiophene and
2,7-bis-(6'-methyl-2-benzoxazoly)-9-ethyl-3-hydroxycarbazole. Such bis-benzazoly compounds are expected to have exceedingly high extinction coefficients with concomitant short fluorescence lifetimes (cf. column 23).

The compounds according to the second invention differ from the compounds of D1 in that the central ring system is a 9,9-dipropylfluorene and not dibenzofuran, dibenzothiophene or carbazole derivative.

The technical problem underlying the second invention is seen in the provision of alternative compounds for use as UV filters.

The document D1 shows that the central ring system can be varied (Z is NR, O or S). However, a 9,9-dipropylfluorene system is only contained in benzoxazole derivatives (cf. examples 7, 11 and Figure 3).

Therefore, D1 does not prompt the skilled person to replace NR, O or S in the group Z by $C(CH_2CH_2CH_3)_2$.

As D1, the document D3 relates to fluorescent compounds which can be used as scintillators (cf. page 2414) and discloses the compound XVII and its spectral properties. As said compound only contains a fluorene and not a 9,9-dipropylfluorene system, D3 does also not prompt the skilled person to the subject-matter of the second invention.

For the same reasons, the claims relating to polymers containing said compounds, their use in a manufacturing method and their preparation also involve an inventive step.